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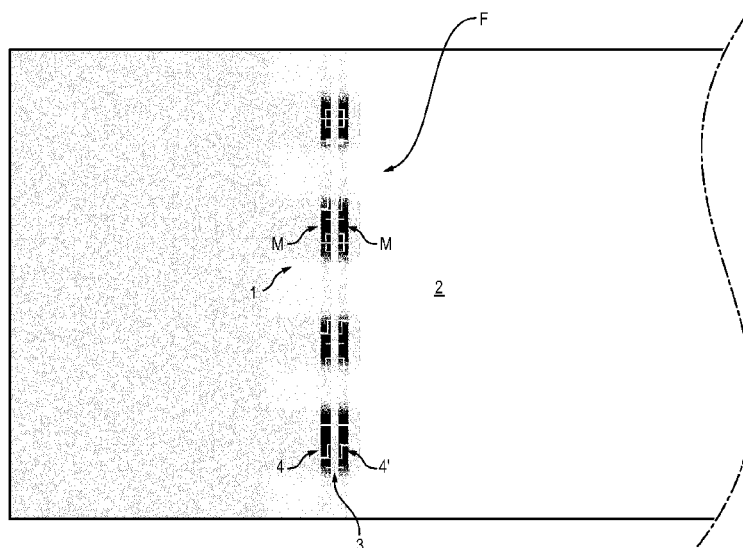
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[Suite sur la page suivante]

(54) Title : SECURITY STRIP AND DOCUMENT PROVIDED THEREWITH

(54) Titre : BANDEAU DE SECURITE ET DOCUMENT QUI EN EST POURVU

FIG. 5



(57) Abstract : The present invention relates in particular to a security strip (1) to be partially embedded into the structure of a security document (2) at least partially made of fibers, said strip being flush at the surface of the document in the form of a set of windows (F), and including a transparent or translucent support material which is coated on one so-called upper surface thereof with a coating that is visible by means of reflection, and which includes a longitudinal strip (3) which is at least partially free of said coating and which separates first and second thread-forming areas (4, 4') coated with said coating, characterized in that each of the thread-forming areas (4, 4') has two different optical renderings and/or patterns that are visible by means of reflection, respectively, and in that said thread-forming areas include negative patterns (M) referenced relative to one another, respectively, i.e. at least one pair of said referenced patterns always has the same spacing pitch along said areas.

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**Déclarations en vertu de la règle 4.17 :**

- *relative au droit du déposant de demander et d'obtenir un brevet (règle 4.17.ii))*
- *relative au droit du déposant de revendiquer la priorité de la demande antérieure (règle 4.17.iii))*

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La présente invention se rapporte notamment à un bandeau de sécurité (1) destiné à être incorporé en partie dans la structure d'un document de sécurité (2) au moins partiellement constitué de fibres, ce bandeau émergeant à la surface dudit document sous la forme d'un ensemble de fenêtres (F), et comprenant un matériau support transparent ou translucide, recouvert, sur l'une de ses faces, dite «face supérieure», d'un revêtement visible par réflexion, et qui comporte une bande longitudinale (3) au moins partiellement dépourvue dudit revêtement, laquelle sépare une première et une seconde zones (4,4') formant fils, recouvertes dudit revêtement, caractérisé par le fait que chacune desdites zones formant fils (4,4') présentent respectivement deux rendus et/ou effets optiques différents visibles par réflexion, et qu'elles comportent des motifs en négatif (M) qui sont en repérage respectivement les uns avec les autres, c'est à dire qu'au moins une paire de ces motifs (M) en repérage présente toujours le même pas d'écartement le long desdites zones.

SECURITY STRIP AND DOCUMENT PROVIDED THEREWITH

5 The present invention relates to a security strip designed to be incorporated in part in the structure of a security document at least partially comprising fibres.

It also relates to a security document provided therewith.

To guard against counterfeiting of security documents such as banknotes, the use of various security means such as watermarks, fibres, spot
10 marks, etc. has already been proposed.

Other techniques consist of introducing an elongated element made of synthetic material forming a « security thread » to the paper of the security document to further increase the difficulty of manufacturing counterfeit products, but also to make authentication of the document easier by a
15 « lambda » user, in other words « the man in the street ».

The first threads introduced to paper were « embedded », which signifies that they are trapped in the mass of the paper by being incorporated during manufacture of the notes. They were therefore designed so that they are invisible in reflected light and visible in transmitted light, that is, by
20 transparency.

Since then, paper manufacturers have developed numbers of threads of different types. These are for example coloured and magnetic threads, bearing information legible by machines, with intermittent digital coding, fluorescent, partially demetallised, micro-printed, holographic, etc.

25 According to a more recent technique, it has been proposed to incorporate the security thread so that it is visible by reflection only in the form of a set of windows. This means that this thread is incorporated in the mass of the paper such that it is both embedded in the mass and also flush with the surface of one of the faces of the note, which explains the use of the title
30 « windows ».

Therefore, the windows are visible by reflection, whereas the « immersed » parts are visible by transmission only. The term « reflection » means the phenomenon by which incident light beams are reflected at the surface of the support. Patent WO 2005/069231 also discloses introducing two
35 parallel threads on two distinct tracks. This boosts the size and number of zones of visible threads. However, there are numerous restrictions as to the use of such

technology. First, a minimum distance between two threads has to be respected for manufacturing reasons. Also, there is the difficulty of identification between the designs of threads. In addition, the process of managing the simultaneous and synchronised placing of two threads in the paper of the security document is
5 ponderous and complex. Finally, the presence of two threads in the support is shown by substantial deformation of the latter.

The aim of the present invention is to rectify these disadvantages by proposing a strip which comprises two zones giving the illusion of comprising two different threads and whereof the especially optical effects make its
10 fraudulent imitation particularly complex.

Therefore, the present invention relates to a security strip designed to be incorporated in part in the structure of a security document at least partially comprising fibres, this strip emerging at the surface of said document in the form of a set of windows, and comprising a transparent or
15 translucent support material, covered on one of its faces, so-called « upper face », by a coating visible by reflection, and which comprises a longitudinal strip at least partially devoid of said coating, which separates a first and a second zone forming threads, covered by said coating characterised in that each of said zones forming threads has respectively two different renderings and/or optical effects
20 visible by reflection, and in that it comprises designs in negative which are respectively tracking each other, that is, at least one pair of these tracking designs always has the same spacing pitch when it is repeated along said zones.

Because of this combination of characteristics, the person observing the security document in which this strip is integrated has the illusion
25 of dealing with two different threads, because they combine respectively two renderings and/or different optical effects. This phenomenon is combined with tracking designs contained therein. In fact, the designs and/or messages contained in these designs are invariably positioned relative to each other, and « respond » via axial or central symmetries, or even via translations or are
30 completed mutually.

According to other advantageous and non-limiting characteristics of the invention:

- said longitudinal strip has straight and parallel edges;
- said longitudinal strip has non-straight and/or non-parallel edges;

- said coating comprises at least two layers selected from the following: layer of optically variable ink, magnetic or not, layer of ink with iridescent effect, holographic layer, metallic layer, opaque layer of ink;
- 5 - the strip comprises, between said support material and said metallic layer, a transparent layer, without optical effect, this layer having a different thickness in each of said zones forming a thread, as well as a light-absorbing layer;
- at least one printing of black colour and/or at least one layer
10 obtained by deposit under vacuum extend on the lower face of said support material, such that it is at least partially visible by transmission;
- said strip is coated partially by an opaque or metallic layer, the coverage rate of this strip being preferably less than or equal
15 to 50% of its surface.

Another aspect of the invention relates to a security document, such as a banknote, a passport or the like.

This document is remarkable in that it integrates a strip according to one of the characteristics identified earlier, which is incorporated within the
20 latter, while emerging at the surface of at least one of its visible faces in the form of a set of windows.

Preferably, the lower face of the strip is covered by a layer of ink of the same colour as that of the material comprising the document.

Other characteristics and advantages of the invention will emerge
25 from the following description of a preferred embodiment of the invention. This description is given in reference to the attached diagrams, in which:

- figure 1 is a partial plan view of a security document, in this case a banknote, in which a strip is incorporated partially, the designs which it comprises however not being integrated;
- 30 - figures 2 to 4 are views in transversal section of three embodiments of said strip (in these figures, it is clear for the sake of simplicity that only those elements covering the « upper » face of the support material of the strip are illustrated);
- figure 5 is a view equivalent to figure 1 of yet another
35 embodiment of a note;

- figures 6 to 8 are plan views of three other variants of the strip, the latter of which shows the strip in the form of windows;

- figures 9 to 12 finally are views of four more embodiments of the strip of the invention.

5 Throughout the present application, the expression "zones with different optical effects " means zones which, visually, to the naked eye and via reflection can differ from each other. These are for example zones having a change of colours between two shades of colour as a function of the inclination of the support or accompanied by different light-diffraction effects. In the
10 embodiment in which the optical effects are the same, the renderings will be different, which shows only in changes in different colour within two threads.

 The strip 1 according to the invention is illustrated in the accompanying figure 1 partially integrated in a security document 2 which consists here of a banknote. According to a non-illustrated variant, it could be
15 another type of security document such as a passport.

 This security document is preferably based on cotton paper, with or without chemical pulp, of paper based on cellulose or any other material containing fibres of different types and gram weights. A hybrid support combining polymer(s) and paper can also be utilised.

20 As is well known from the technology, the strip 1 is incorporated partially in the document 2, while emerging at its surface in the form of a set of windows F.

 This strip 1 comprises a longitudinal median strip 3 which separates one from the other and delimits two zones forming threads 4 and 4'
25 having straight and parallel edges. This gives the illusion for the observer that the « threads » are separate and independent of each other.

 As will be evident later, each zone 4 and 4' is covered by a coating and each of them has optical renderings EO1 and EO2 distributed in different regions. The effect EO1 is for example given by a coating of magenta colour
30 which switches to green, whereas the effect EO2 is given by a coating of green colour which switches to blue.

 The designs presented by this strip are not illustrated here, as already specified earlier.

 As shown in figure 2 and as per a first embodiment, the strip
35 according to the invention comprises transparent or translucent support material 5, such as a plastic film. The latter is preferably made of polyester, for example

with a thickness of around 10 µm. On the lower "external" face 51 of the strip (that is, that turned towards the core of the document, paper side), it is preferably coated by a layer of ink of the same colour as the paper (for example a thickness of around 2 µm). If this layer of ink is not applied, the layers applied to the upper surface are seen at least partially. In other words, this ink has a masking function.

Finally, a layer of external adhesive of around 4 to 5 µm in thickness is applied to the whole, to the side of the face 51.

It is designed to improve affixing the strip to the paper. It is evident that these two layers have not been illustrated in figure 2.

Deposited on the face opposite the strip 1 (window side), is an opaque layer of ink 7, preferably black, by any known printing technique (preferably by rotogravure).

Reserves 70 can be made in this printed item so as to create a design M called "design in negative".

Throughout the present application, the term « design » means any design or any character, whether alpha digital or not. The term « negative » signifies that it is delimited by a zone or a contour of different contrast, in this case higher. In other terms, this zone or this contour is visually inverse relative to the subject.

The central strip is preferably largely devoid of ink so as to delimit two very distinct zones 4 and 4'.

Applied to the zones 4 and 4' is an optically variable layer. This is done by printing for example of ink of type OVI® or SICPASTAR® by the company SICPA. Inks having different optical effects are preferably deposited on the zones 4 and 4'. The transparent parts of the strip 1 (that is, the parts devoid of opaque ink and/or metallic deposit) will show no optical effect in colour change, as compared to the parts of the strip vertical to the opaque zones.

According to the structure illustrated in figure 3, the same effect can be created by depositing a fine layer 7 of metal, for example aluminium or copper (creating a mirror effect) by any known deposit technique under vacuum, then partial de-metallisation to create designs in negative. A transparent layer 8 without particular optical effect is then deposited in a controlled thickness, as is a layer 9' of absorbent material of Inconel type (registered trade mark). The colour of the optical effect product will depend on the thickness of this layer 8.

Next comes deposit under vacuum of a metallic layer 9 for example of chrome type, such that this layer 9 is vertical to a metallic zone 7. A colour change effect occurs during modification of the angle of observation.

An adhesive of around 2 μm in thickness is then deposited on the face opposite the thread (window side). According to the required level of resistance, a polyester film of around 10 μm in thickness can be laminated to give the strip and its associated layers adequate physical-chemical resistance. A primary (if needed) and a final layer of adhesive of around 4 to 5 μm in thickness is deposited to ensure correct and adequate adhesion between the strip and the paper fibres.

In a preferred embodiment not illustrated here, the central strip 3 devoid of coating and separating the strip into distinct two zones is printed using a second-level security ink selected from fluorescence, phosphorescence, visible infrared inks etc. This printing is easily visible through the central strip 3.

In another preferred embodiment visible in figure 4, the central strip 3, devoid of optically variable material, can be previously coated in an opaque or metallic-type layer 7 in turn partially « hollowed » of material so as to create designs M in negative. The « partially hollowed » terminology means that the coverage rate of said strip is less than or equal to 50%.

These designs will be difficult to see in reflection but will be easily visible by transparency. They are arranged so that they are in exact register with the optically variable zones 4 and 4'. These designs can take varied forms such as blocks, and can be arranged periodically and repetitively.

Still in a preferred embodiment, these arrangements can create a sequence of "barcode" type legible automatically by a machine.

Opaque black ink can also have a character conducive to electric current. In this case, the printed design must be continued in the longitudinal direction of the strip on one or the other of the zones 4 and 4' to ensure electrical conductivity. This electrical conductivity can be read and detected by a sorting machine.

In yet another preferred embodiment, the designs formed on the first and second distinct zones 4 and 4' are completed to form an overall design whereof both parts are in exact register. It should be noted that this third embodiment would be particularly difficult to produce if it were done by incorporating two separate threads.

Throughout the description the embodiments of figures 5 to 8 will be detailed. It is evident that the dimensions which are noted there have no limiting character. However, with respect to the width of the strip, the latter is preferably between 1 and 6 mm.

5 Figure 5 shows a security strip 1 of a width of 4 mm, incorporated into windows in a banknote 2. It is coated in optically variable magenta/green ink visible in the zone 4 and green/blue in the zone 4'. The strip has a strip 3 devoid of material, of a width of 1 mm separating the strip 1 into two parallel disjointed zones 4 and 4'. Zones devoid of material are also arranged on each of
10 the two strips 4 and 4' tracking each other so that they form designs exactly opposite each other.

 However, the case where they are exactly opposite is feasible, but offset longitudinally by the same constant value over the entire longitudinal extent of the zones forming threads.

15 Figure 6 shows a security strip 1 of a width of 4 mm coated both with optically variable green/magenta ink and also with optically variable magenta/green ink. The strip 1 has a strip 3 devoid of material, of a width of 1 mm, separating the strip 1 into two parallel disjointed zones 4 and 4'. Designs M in negative are arranged tracking each other respectively on one and the other of
20 the zones 4 and 4'. In the central strip 3, opaque ink forms designs M' in negative. These designs are arranged in sequence of repetitive blocks. This sequence is slightly visible in reflection in the surface zones of the paper and easily visible in transmission.

 Figure 7 shows a security strip 1 comprising two holographic zones
25 4 and 4' having a diffractive effect from blue to red (passing through all the other colours of the visible spectrum) and a diffractive effect from red to blue. The strip 1 has a strip 3 devoid of coating of width 1 mm, separating parallel zones 4 and 4'. Designs are arranged tracking each other respectively on one and the other of the zones 4 and 4'.

30 In the central strip 3, opaque ink creates designs in negatives M'. These designs are arranged in sequence of repetitive blocks. This sequence is slightly visible in reflection in the surface zones of the paper and easily in transmission.

 Figure 8 shows another embodiment of the strip, integrated
35 partially in the paper of a security document. This relates to a zone 4 which has zones for colour change as in the preceding embodiments and a zone 4' with

diffracting effect. Designs printed in black colour (and therefore not optically variable) together forming a sort of barcode extend along the central strip 3. As emerges from the above, the invention produces a visual "double thread" effect by using a single strip. This visual effect can be authenticated by the public. The distinct zones created by the absence of central material incorporate effects of colour and/or metallisation change. This combination of effects is visible at the surface of the paper, in the windows. Designs created on one or the other of the zones can be placed in perfect register. They can also form a sequence of "barcode" type and provide a second level of security.

10 The strip of figure 9 has two zones 4 and 4' of different width, the central strip 3, having straight and parallel edges being offset relative to the median longitudinal axis of the strip. Evident here is the presence of designs M and M', the latter being in negative, which combine to form a diagram consisting of the representation of a trombone. All the designs of the strips 4 and 4' are of course in register. The strip 4 varies from the colour green to the colour violet, 15 whereas the strip 4' has a metallise violet appearance.

Figure 10 relates to two zones 4 and 4', separated by a strip 3 whereof the longitudinal edges are not straight, but « corrugated », that is, slightly curved, convex portions being alternated with concave portions. The 20 strip 4 varies from red to green, whereas the strip 4' varies from blue to green.

Figure 11 illustrates an embodiment in which the strips 4 and 4' each have saw-tooth edges, such that the same applies for the central strip 3. The strip 4 has a metallised appearance of copper type, whereas the strip 4' has a metallised appearance of aluminium type.

25 Finally, figure 12 deals with two strips 4 and 4' of quite different shape and appearance. The bottom of each has a metallised appearance of aluminium type whereof the density varies along each of the strips. The strip 4, wider than the strip 4', comprises multiple multicoloured designs. The edges of the strip 3 are formed by a succession of portions of a circle, a circular long section in negative, repeated in this strip, registered partially in one of the these 30 portions of a circle.

In the claims which follow and in the preceding description of the invention, except where the context requires otherwise due to express language or necessary implication, the word "comprise" or variations such as "comprises" 35 or "comprising" is used in an inclusive sense, i.e. to specify the presence of the

stated features but not to preclude the presence or addition of further features in various embodiments of the invention.

It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication
5 forms a part of the common general knowledge in the art, in Australia or any other country.

CLAIMS

- 5
- 10
- 15
- 20
- 25
- 30
1. A security strip designed to be incorporated in part in the structure of a security document at least partially comprising fibres, the security strip emerging at the surface of said document in the form of a set of windows, and comprising a transparent or translucent support material, covered at least in part by a coating visible by reflection, and which comprises a longitudinal strip at least partially devoid of said coating, which separates first and second zones forming threads, covered by said coating, wherein each of said zones forming threads has respectively two different renderings and/or optical effects visible by reflection, and in which designs in negative are respectively tracking each other, that is, at least one pair of these tracking designs always has the same spacing where the designs are repeated along said zones.
 2. The strip as claimed in Claim 1, wherein said longitudinal strip has straight and parallel edges.
 3. The strip as claimed in Claim 1, wherein said longitudinal strip has non-straight and/or non-parallel edges.
 4. The strip as claimed in Claim 1, wherein said coating comprises at least two layers selected from the following: layer of optically variable ink, magnetic or not, layer of ink with iridescent effect, holographic layer, metallic layer, opaque layer of ink.
 5. The strip as claimed in Claim 2, in which said coating comprises a metallic layer, wherein the strip comprises, between said support material and said metallic layer, a transparent layer, without optical effect, this layer having a different thickness in each of said zones forming a thread, and a light-absorbing layer.

- 5
6. The strip as claimed in any one of Claims 1 to 3, wherein at least one printing of black colour and/or at least one layer obtained by deposit under vacuum extends on a lower face of said support material, such that the strip is at least partially visible by transmission.
- 10
7. The strip as claimed in any one of the preceding claims, wherein said strip is coated partially by an opaque or metallic layer, the coverage rate of the strip being less than or equal to 50% of a surface area of the strip.
- 15
8. A security document, such as a banknote, wherein the security document includes the strip as claimed in any one of Claims 1 to 7, which is incorporated within the security document, while emerging at the surface of at least one of a visible face of the document in the form of a set of windows.
- 20
9. The security document as claimed in Claim 8, wherein a lower face of said strip is covered by a layer of ink of the same colour to that of the material comprising said document.

FIG. 1

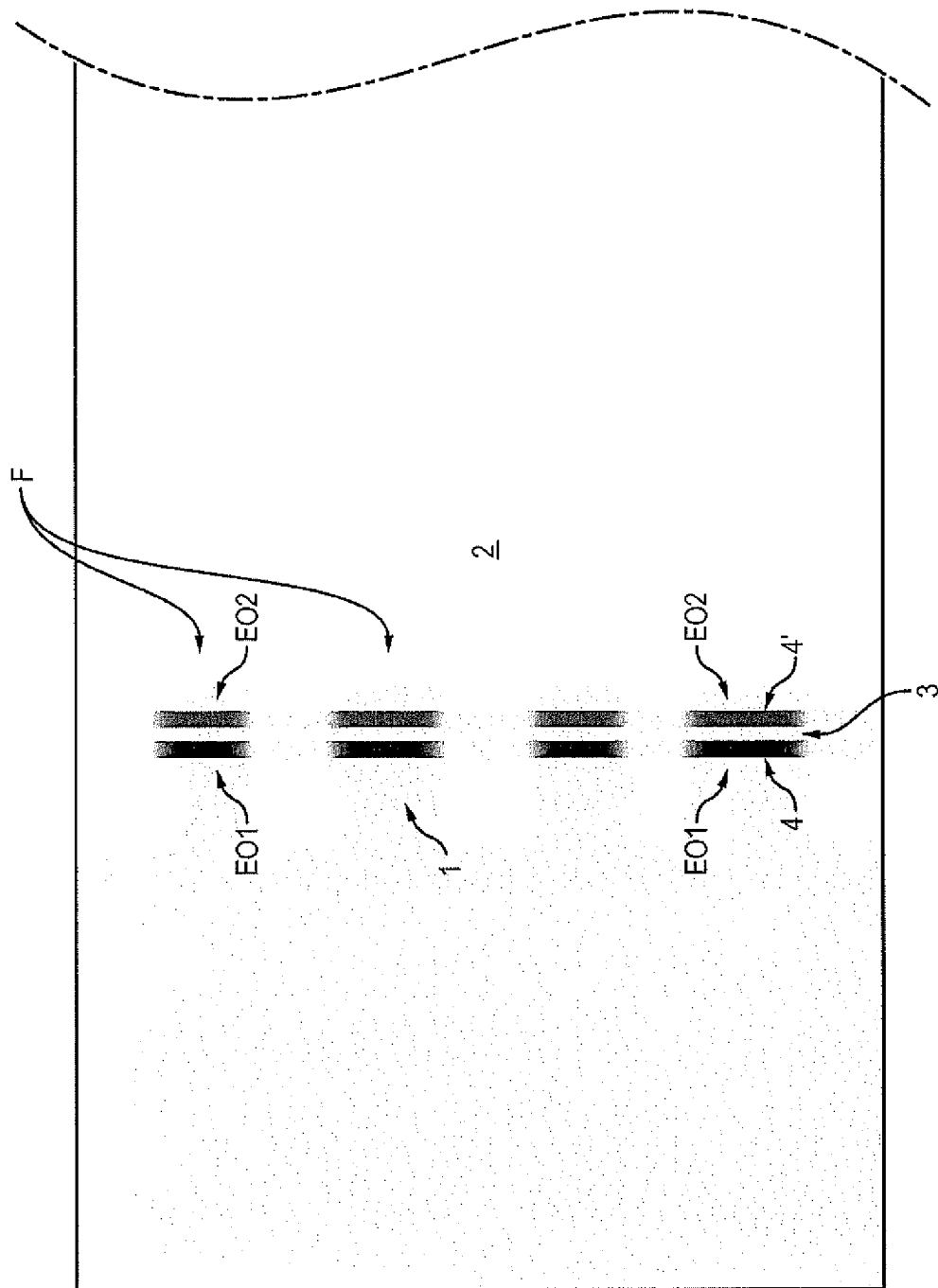


FIG. 2

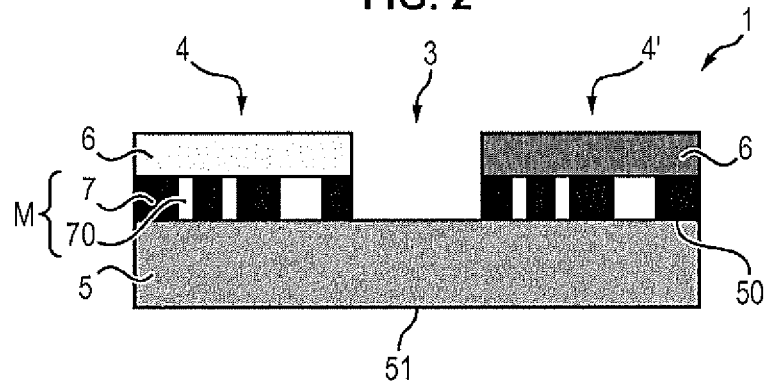


FIG. 3

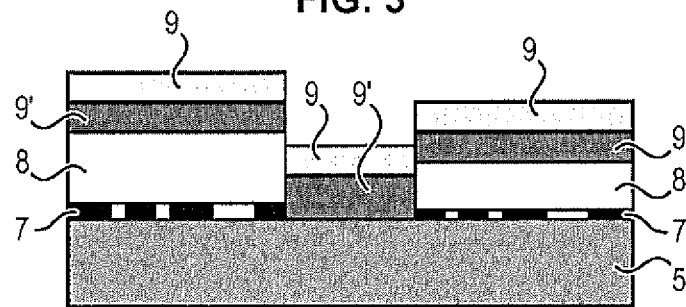


FIG. 4

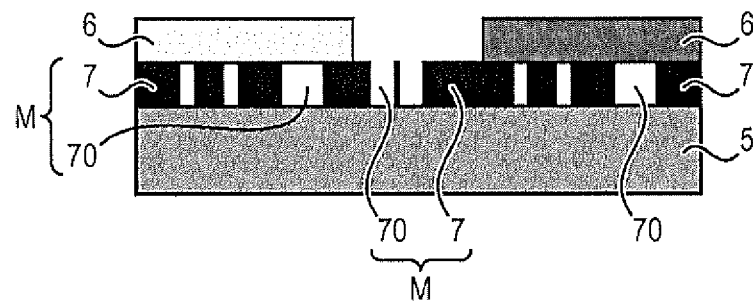


FIG. 5

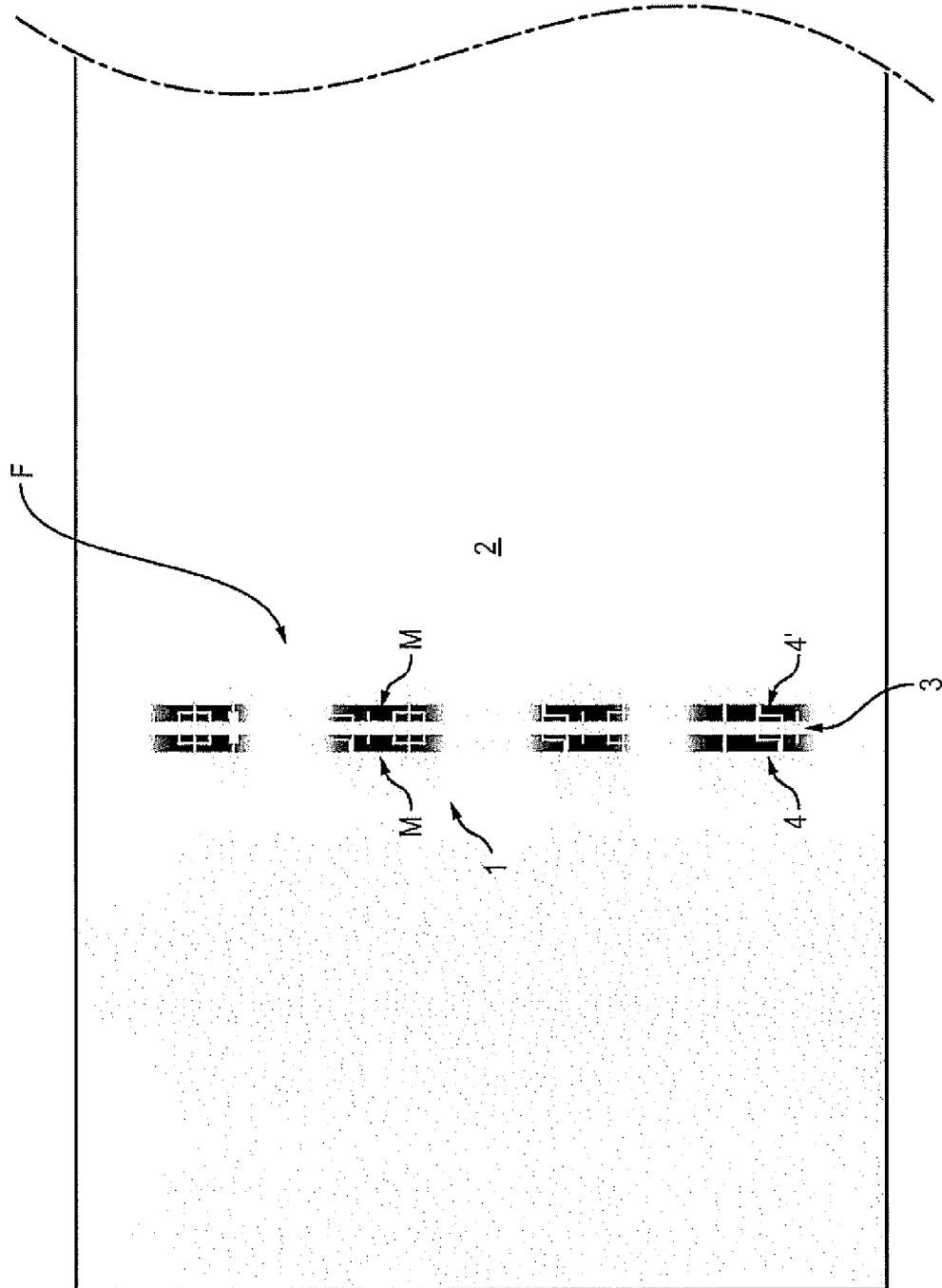


FIG. 6

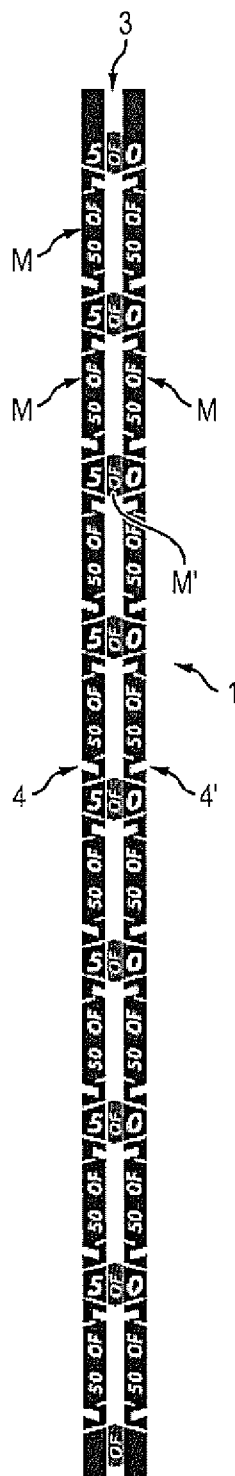


FIG. 7

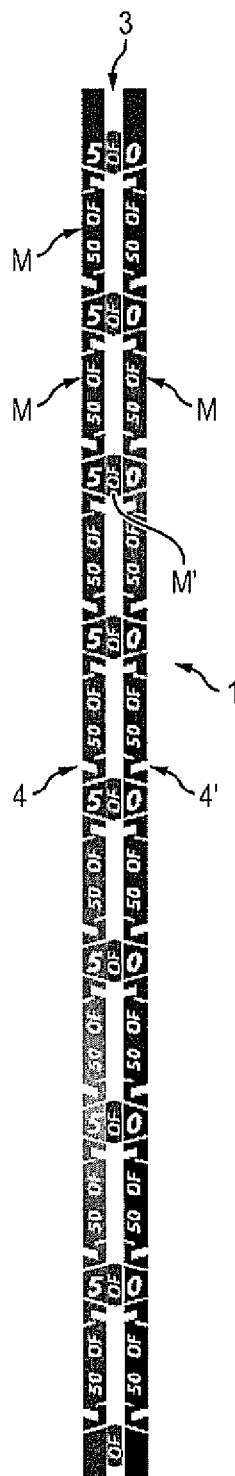


FIG. 8



